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(71) Applicant *(for all designated States except US)*: **FINVAC OY** [FI/FI]; Myllytie 2, FIN-34800 Virrat (FI).

(72) Inventor; and
(75) Inventor/Applicant *(for US only)*: **GRÖNBERG, Jouko** [FI/FI]; Pirkantie 15, FIN-34800 Virrat (FI).

(74) Agent: **LEITZINGER OY**; Tammasaarenkatu 1, FIN-00180 Helsinki (FI).

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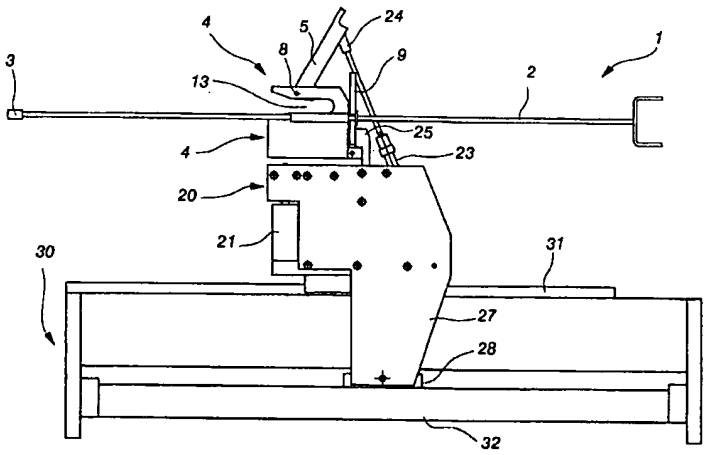
(54) Title: APPARATUS FOR TENTERING HIDES



(57) Abstract: The invention relates to an apparatus for tentering hides or leathers. A hide is placed for tentering and drying on a frame (1), having between its outer rim and central block (3) a number of guide bars (2), which enable tentering clamps (4) to slide back and forth therealong. The tentering clamps (4) are manipulated by means of carriages (20) included in a leather replacement table (30). Each carriage (20) is provided with a coupling mechanism (21, 22), which is engageable with the tentering clamp (4) for moving the same together with the carriage (20). Each tentering clamp (4) is braced on two parallel guide bars (2), both of which have the plane of their top surface in the proximity of a bottom side (14) of a gripper claw (3). The carriage (20) is provided with a brake release mechanism (25) for releasing a brake (9, 11) of the tentering clamp in response to the carriage having its coupling element (22) engage with the tentering clamp (4). The carriage (20) is provided with an optical detector (26), which is adapted to detect the edge of a leather (L) advancing into the gripper claw (13).

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Apparatus for tentering hides

The invention relates to an apparatus for tentering hides or leathers, said apparatus comprising

- a frame for placing a hide or leather thereon for tentering and drying
- a number of first guide bars attached to the frame by the first ends thereof
- a holding block, located in the central region of the frame and having the second ends of the guide bars attached thereto
- a number of tentering clamps, mounted on the first guide bars slidably for moving the same back and forth between the outer rim of the frame and the holding block
- a gripper claw included in the tentering clamp, which is defined by a gripper jaw integral with a pivoted arm, which in a first position, a gripping position, of the arm engages a hide presently in the claw and, in a second position, a releasing position, disengages the hide
- a brake included in the tentering clamp, which engages the guide bars and stops a movement of the tentering clamp in the direction from the outer rim of the frame towards the holding block
- a number of carriages for tentering clamps
- a number of second guide bars underneath and parallel to the first guide bars, the carriages being supported, preferably bearing-mounted on the second guide bars for moving the same back and forth along the second guide bars
- a number of power units for moving the carriages back and forth along the second guide bars; and
- a coupling mechanism included in the carriage, which is engageable with the tentering clamp for moving the latter together with the carriage.

This type of apparatus is known from patent publications US-4,202,190 and US-4,335,594. This prior known apparatus has proved beneficial and useful,

but does have a few downsides. One drawback is that the lateral forces, applied to tentering clamps during the drying process of a hide or leather, cause banking of the tentering clamps, which may lead to a malfunction. Another drawback is that the removal of tentering clamps is difficult for maintenance or replacement. This prior known apparatus has its automation largely based on mechanical functions, which makes the construction complicated and expensive.

It is an object of the invention to provide an improved apparatus, in which the above problems are at least alleviated.

It is a particular object of the invention to improve the bracing of a tentering clamp on guide bars, such that the banking of a clamp caused by lateral forces will be reduced and the removability of a clamp for maintenance or replacement will be facilitated.

A further object of the invention is to improve the cooperation between a tentering clamp and a carriage for a simpler construction for the same.

Yet another object of the invention is to improve the operational reliability of various functions. Such functions include e.g. detecting the edge of a hide, gripping the edge of a hide, locking and releasing a brake, and releasing the edge of a hide.

These and other aspects of the invention, which appear in detail in the following description of one embodiment, will be accomplished on the basis of the characterizing features set forth in the appended claims.

In the accompanying drawings:

Fig. 1 shows a substantial portion of an apparatus of the invention in a side view;

Fig. 2 shows schematically in a side view a tentering and drying facility for hides, which embodies an apparatus of the invention;

Fig. 2A shows in a plan view a tentering and drying frame for hides, without tentering clamps;

Figs. 3A and 3B shows in a side and front view, respectively, a tentering and drying clamp for hides, which is slidably supported on guide bars 2 in a drying frame 1; and

Figs. 4A-4H depict various operating sequences for an apparatus of the invention, which in alphabetical order are as follows: (A) retrieving a hide; (B) detecting the edge of a hide and stopping the movement; (C) clamping a hide; (D) tentering a hide; (E) moving a carriage 20; (F) moving a carriage 20 for disengaging a hide; (G) disengaging a hide; and (H) moving a carriage 20 and a tentering clamp 4 to a starting position.

Figs. 1, 2 and 2A visualize a frame 1 for placing a hide or leather thereon for tentering and drying. The frame 1 consists of an outer rim, a holding block in the central region, and guide bars 2 braced to a tension therebetween and attached by the distal ends thereof to the outer rim of the frame and by the proximal ends thereof to the holding block 3, which has an elongated shape, such that the guide bars 2 on the long sides of the frame are almost parallel to each other. The guide bars 2 are round steel bars, having a thickness of about 5-7 mm.

The guide bars 2 are arranged pairwise side by side and each pair of guide bars is fitted with a tentering clamp 4. Along the sides of the tentering clamp 4 extend guide channels or bushings 12 (fig. 3A and 3B) for accommodating the guide bars of a pair of guide bars 2. The channels 12 can be closed with an openable protective cover, or the bushings, which are slidable around the guide bars 1, are releasably attached to the body of the tentering clamp 4. When the tentering clamp is in a secured position between the guide bars 2 of a pair of guide bars, said tentering clamp 4 can be released by distancing the tensioned guide bars 2 of a pair of guide bars from each other. Thus, the guide bars 2 function as slide tracks for the tentering clamps 4, such that the clamps are allowed to travel back and forth between the outer rim of the frame 1 and the holding block 3.

A gripper claw 13, which is included in the tentering clamp 4 and which opens towards the holding block 3, is defined by a gripper jaw 6, 7 integral with a pivoted arm 5. In a first position of the arm 5, i.e. in a gripping position, the jaw 6, 7 clamps on a hide or leather L presently in the claw 13. In a second position, i.e. a releasing position, the gripper jaw 6, 7 lets go of the leather L. The releasing position is shown in fig. 1 and the gripping position in fig. 3. Respectively, the releasing position is shown e.g. in fig. 4A and the gripping position in fig. 4C. The guide bars 2 have the plane of their top surface lying in the close proximity of a bottom side 14 of the gripper claw 3. The vertical drop is equal to a material thickness, about 2-3 mm, needed for the top edge of the channels 12.

The tentering clamp 4 is provided with a brake 9, 11, which engages with the guide bars 2 and stops a movement of the tentering clamp 4 from the outer rim of the frame 1 towards the holding block 3, yet allows a movement in the opposite direction. The brake 9, 11 comprises a lever pivotable about a journal 10, having its plate member 11 provided with close-fit passages for the guide bars 2. The lever 9, 11 is biased by a spring 19 to a braking

position (Fig. 4E), wherein the close-fit passages engage with the guide bars 2 and stop the movement of the tentering clamp 4 from the outer rim towards the centre of the frame 1. The brake lever 9, 11 is pivotable against the action of the spring 19 to a position, in which the tentering clamp 4 is allowed to move in both of its traveling directions. Therefore, a carriage 20, which will be described in more detail hereinafter, is provided with a brake release mechanism 25, which turns the brake lever 9, 11 against the action of the spring 19 as the carriage 20 is locked to the tentering clamp 4.

Hence, the apparatus includes a number of carriages 20 for tentering clamps. The figures only illustrate a single carriage, but it should be appreciated that below each pair of guide bars 2 must be a carriage 20. For this reason, a number of second guide bars 31 is arranged underneath and in a parallel relationship with the first guide bars 2. The carriages 20 are bearing-mounted or slidably fitted on the second guide bars 31, said carriages 20 being movable back and forth along the second guide bars 31. The carriages 20 are adapted to be operated back and forth by means of power units 32, comprising in the present case a pneumatic cylinder without a piston rod. Extending downward from the carriage 20 on either side of the linear guide bar 31 are brackets 27, which constitute a transmission or drive lever provided with a drive means 28 to engage with the cylinder 32.

A coupling mechanism 22 between the carriage 20 and the tentering clamp 4 comprises a cone-topped or otherwise profiled spindle, which is operated by a solenoid 21 and which, upon finding a coupling recess 16 in the tentering clamp 4, uses its conical surface or other appropriate profile to displace the tentering clamp 4 relative to the carriage 20 in such a way that the brake lever 9, 11 is pivoted by the brake release mechanism 25 to a position, in which the tentering clamp 4 is allowed to move in both of its traveling directions along the guide bars 2. Thus, the brake 9, 11 is automatically released every time the carriage 20 couples with the tentering clamp 4.

The carriage 20 is provided with a pneumatic piston-cylinder assembly 23, 24 for turning the arm 5 from a gripping position to a releasing position, when the carriage 20 and the tentering clamp 4 are carried as a mutually coupled assembly towards the edge of a hide or leather L subjected to tentering, or when a tentered leather L' is disengaged from the tentering clamp 4.

Figs. 4A-4H further illustrate an optical detector 26 included in the carriage 20, capable of detecting the edge of a hide or leather advancing into the gripper claw 13. When the edge of a hide or leather is detected by the detector 26, the arm 5 is released by the piston-cylinder assembly 23, 24 to pivot in response to the action of a spring 18 from a releasing position to a gripping position, in which a friction pad 7, included in the gripper jaw 6, 7, is set below a pivot journal 8 of the arm 5, slightly offset from a vertical line extending through the pivot journal, such that the hide or leather stretching force urges to pull the friction pad 7 towards said vertical line, hence tightening the clamp of the gripper jaw 6, 7 on the hide or leather. Thus, the pivot journal 8 and the friction pad 7 have a mutual disposition which provides for a self-tightening clamp on the edge of the hide or leather L.

The apparatus has its operation progressing as follows.

The tentering and drying frame 1 is placed on a leather replacement table 30 visible in fig. 2. The leather L to be tentered is placed on the frame 1 and spread or dressed by pressing lightly with a press 33. This is followed by moving the tentering clamps 4 by means of the carriages 20 towards the edge of the leather L, the apparatus having assumed its operative position shown in fig. 4A, with the tentering clamps 4 coupled with the carriages 20, with the brake 9, 11 released and the arm 5 upturned for opening the claw 13. The transfer proceeds in the direction of an arrow A. When the optical detector 26, for which the tentering clamp 4 has its body provided with an opening 17, detects the edge of the leather L, the operation is stopped to

the position shown in fig. 4B. Clamping of the hide or leather is effected, as shown in fig. 4C, by contracting the piston 24 of the cylinder 23, whereby the arm 5 is released and pivoted by the spring 18 to a clamping position. This is followed by tentering the hide or leather, effected by moving the apparatus in the direction of an arrow D shown in fig. 4D. When a sufficient tentering force is reached, which can be adjusted by means of the power of the pneumatic cylinder 32 shown in fig. 1, the coupling element 22 of the carriage 20 is disengaged from the recess 16 of the tentering clamp 4, enabling a transfer of the carriage 20 in the direction of an arrow E. The tensioning force of the tentered leather L' urges to shift the tentering clamp 4, but this shifting distance is limited to that traveling distance which is required by the brake lever 9 along the guide bars 2 until the close-fit passages of the brake plate 11 lock onto the guide bars 2. In this case, as well, the conical top of the spindle 22 assists in a controlled transmission of the tentering force to become dependent on the tentering clamp 4.

This is followed by moving the frame 1, which is provided with a tentered wet leather L', into a drying tunnel 34, which may contain a considerable number of frames 1. The frames can be returned along a return track set inside the drying tunnel 34 or via an extra-tunnel route back onto the leather replacement table 30 for the removal of a tentered and dried leather L", which is visualized in fig. 4F. The carriages 20 are traveled in the direction of an arrow F and coupled with the tentering clamps 4. This is followed by effecting the removal of a hide or leather, as shown in fig. 4G, by pivoting the arm 5 with the piston-cylinder assembly 23, 24 to a releasing position, whereafter the carriage 20 can be transferred together with the tentering clamp 4 in the direction of an arrow H shown in fig. 4H. The tentered and dried leather L" is detached and replaced with another wet hide to be tentered, which brings us back to the starting condition shown in fig. 4A.

Claims

1. An apparatus for tentering hides or leathers, said apparatus comprising

- a frame (1) for placing a hide or leather thereon for tentering and drying
- a number of first guide bars (2) attached to the frame (1) by the first ends thereof
- a holding block (3), located in the central region of the frame (1) and having the second ends of the guide bars (2) attached thereto
- a number of tentering clamps (4), mounted on the first guide bars (2) slidably for moving the same back and forth between the outer rim of the frame (1) and the holding block (3)
- a gripper claw (13) included in the tentering clamp (4), which is defined by a gripper jaw (6, 7) integral with a pivoted arm (5), which in a first position, a gripping position, of the arm (5) engages a leather (L) presently in the claw (13) and, in a second position, a releasing position, disengages the leather (L)
- a brake (9, 11) included in the tentering clamp (4), which engages the guide bars (2) and stops a movement of the tentering clamp (4) in the direction from the outer rim of the frame (1) towards the holding block (3)
- a number of carriages (20) for tentering clamps
- a number of second guide bars (31) underneath and parallel to the first guide bars (2), the carriages (20) being supported, preferably bearing-mounted on the second guide bars (30) for moving the same back and forth along the second guide bars (30)
- a number of power units (32) for moving the carriages (20) back and forth along the second guide bars (30); and
- a coupling mechanism (21, 22) included in the carriage (20), which is engageable with the tentering clamp (4) for moving the latter together with the carriage (20);

characterized in that each tentering clamp (4) is supported on two parallel guide bars (2), both having the plane of the top surface thereof within the confines of the gripper claw (13), that the carriage (20) is provided with a brake release mechanism (25), which is adapted to release the brake (9, 11) of a tentering clamp as a result of the carriage coupling mechanism (22) engaging with the tentering clamp (4), that the coupling mechanism (22) comprises a shaped spindle, operated by a solenoid (21), and the tentering clamp (4) is provided with a coupling recess (16) for receiving the spindle (22), and that, with the spindle (22) positioned in the coupling recess (16), the tentering clamp (4) is in such a position relative to the carriage (20) that the brake release mechanism (25) has pivoted the brake (9, 11) to a position in which the tentering clamp (4) is movable in each of its traveling directions along the first guide bars (2).

2. An apparatus as set forth in claim 1, **characterized** in that the brake (9, 11) comprises a pivoted lever, which is provided with close-fit passages for the first guide bars (2) and which is biased by a spring (19) to a braking position, in which the brake lever (9, 11) is pivotable against the action of the spring (19) to a position, in which the tentering clamp (4) is capable of moving in both of its traveling directions.

3. An apparatus as set forth in claim 1 or 2, **characterized** in that the carriage (20) is provided with an optical detector (26), which is adapted to detect the edge of a leather (L) advancing into the gripper claw (13).

4. An apparatus as set forth in any of claims 1-3, **characterized** in that the carriage (20) is provided with a pneumatic piston-cylinder assembly (23, 24) for pivoting the arm (5) from a gripping position to a releasing position, as the carriage (20) and the tentering clamp (4), being coupled together, are transferred towards the edge of the leather (L) to be tentered, or as a tentered leather (L') is disengaged from the tentering clamp (4).

5. An apparatus as set forth in claims 3 and 4, **characterized** in that, when the edge of a leather is detected by the detector (26), the piston-cylinder assembly (23, 24) releases the arm (5) to pivot in response to the action of a spring (18) from a releasing position to a gripping position, in which a friction pad (7) integral with the gripper jaw (6, 7) is located below a pivot journal (8) of the arm (5), slightly offset from a vertical line extending through the pivot journal (8), in such a way that the leather tensioning force urges to pull the friction pad (7) towards said vertical line, hence tightening the clamp of the gripper jaw (6, 7) on the leather.

6. An apparatus as set forth in any of claims 1-5, **characterized** in that on the side of the tentering clamp (4) extend guide channels or bushings (12) detachable from the body of the tentering clamp (4) for accommodating a pair of guide bars constituted by the first guide bars (2), such that the tentering clamp (4) is dismountably positioned between the guide bars (2) of a pair of guide bars, said dismounting being effected by distancing from each other the tensioned guide bars (2) of a pair of guide bars.

7. An apparatus as set forth in claim 6, **characterized** in that the first guide bars (2) are round steel bars, having a thickness of about 5-7 mm.

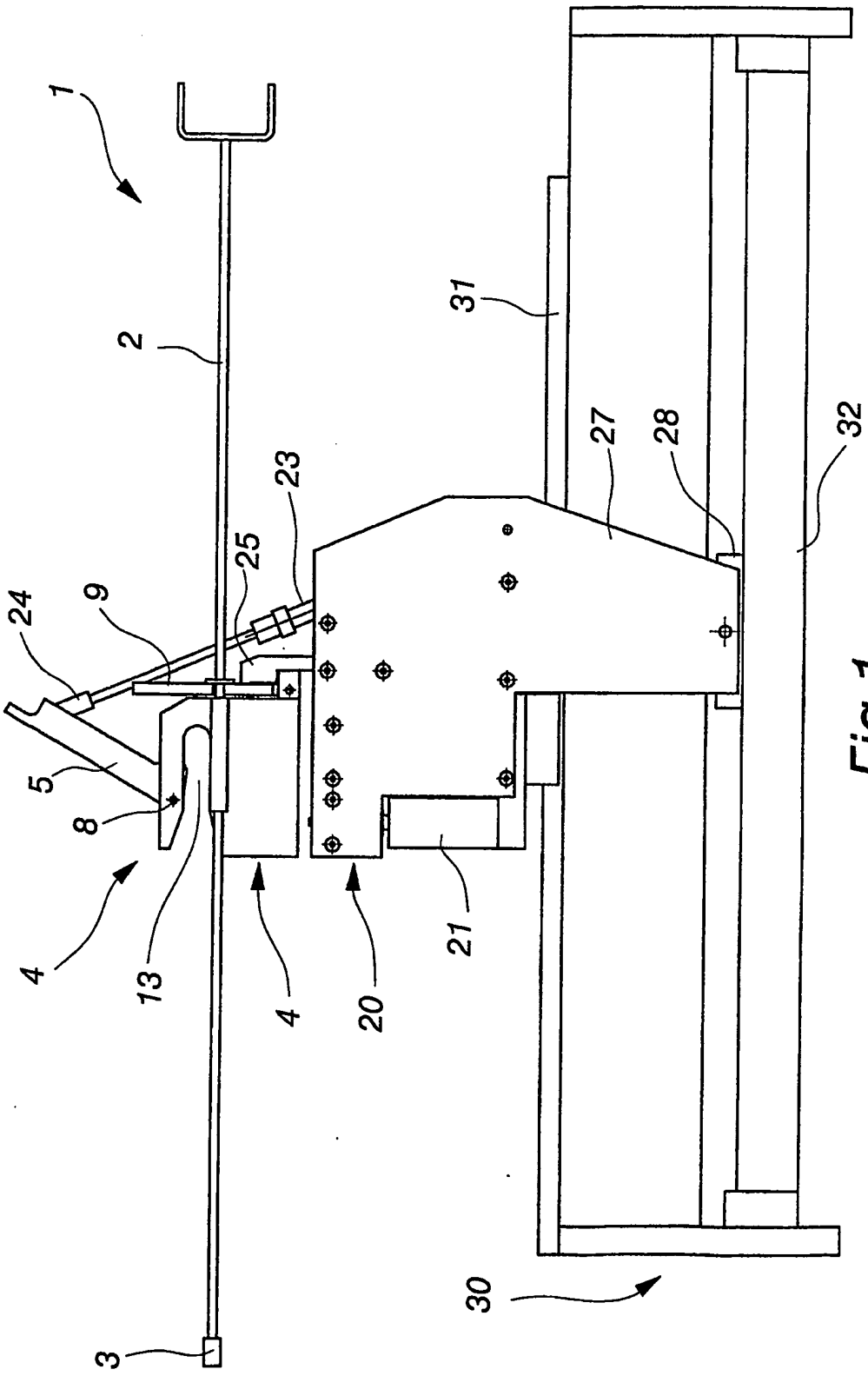

Fig. 1

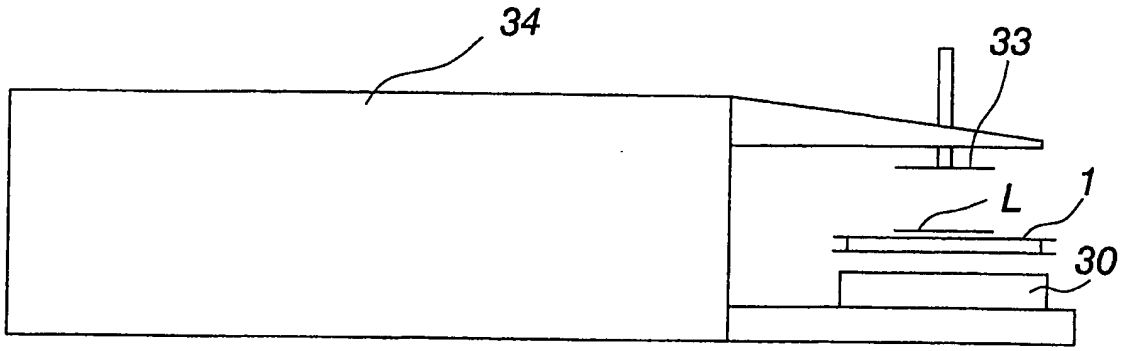

Fig.2

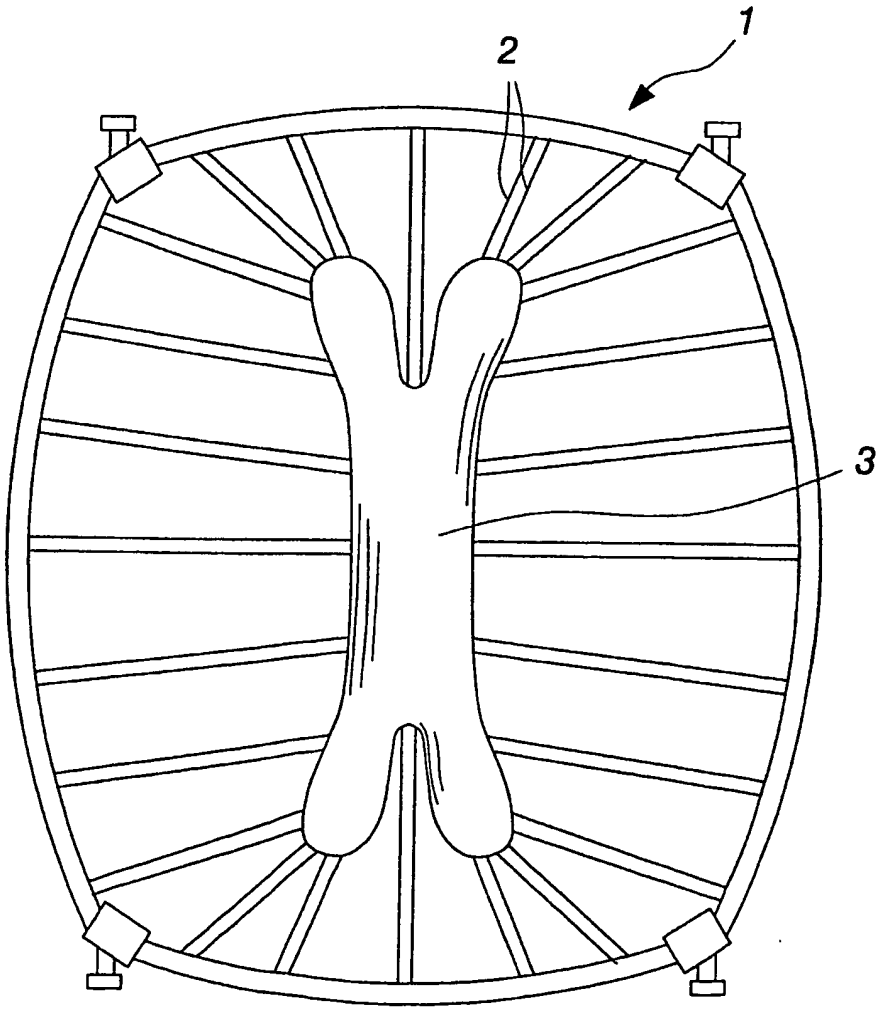

Fig.2A

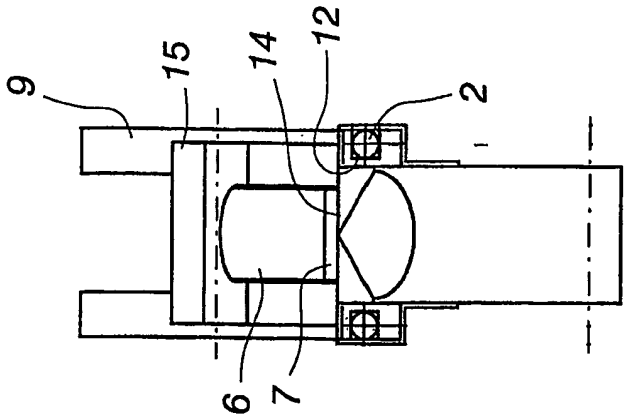

Fig.3B

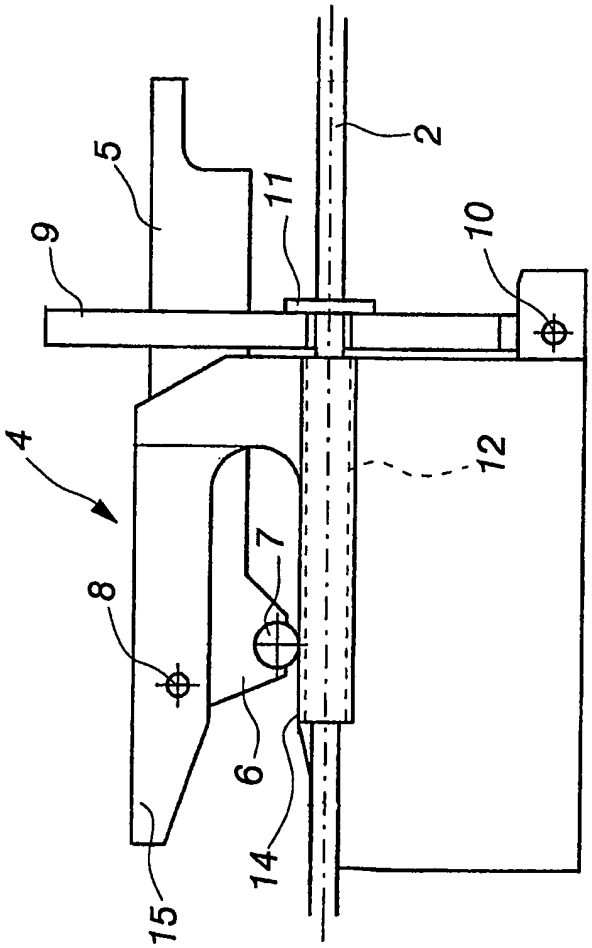

Fig.3A

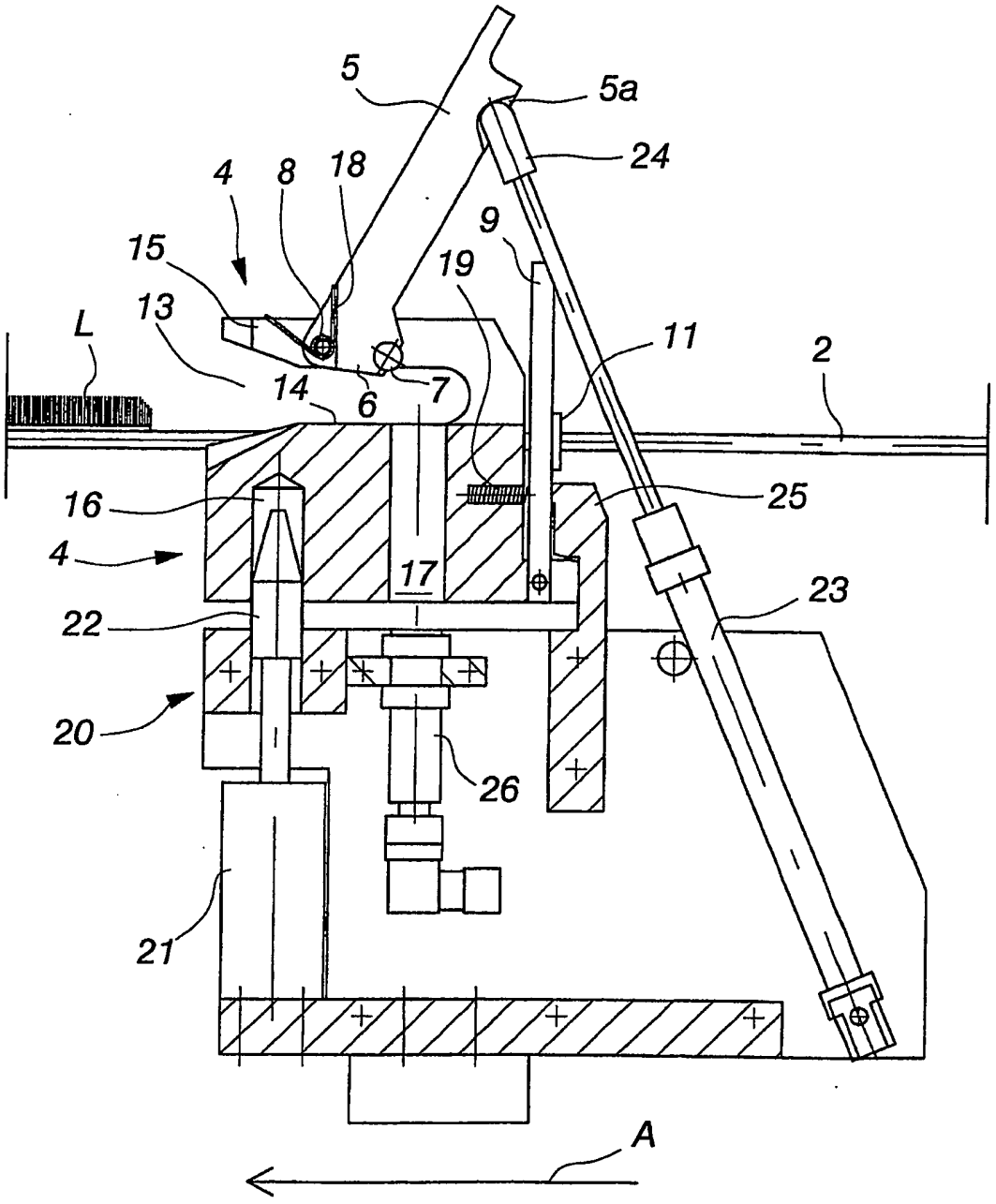

Fig.4A

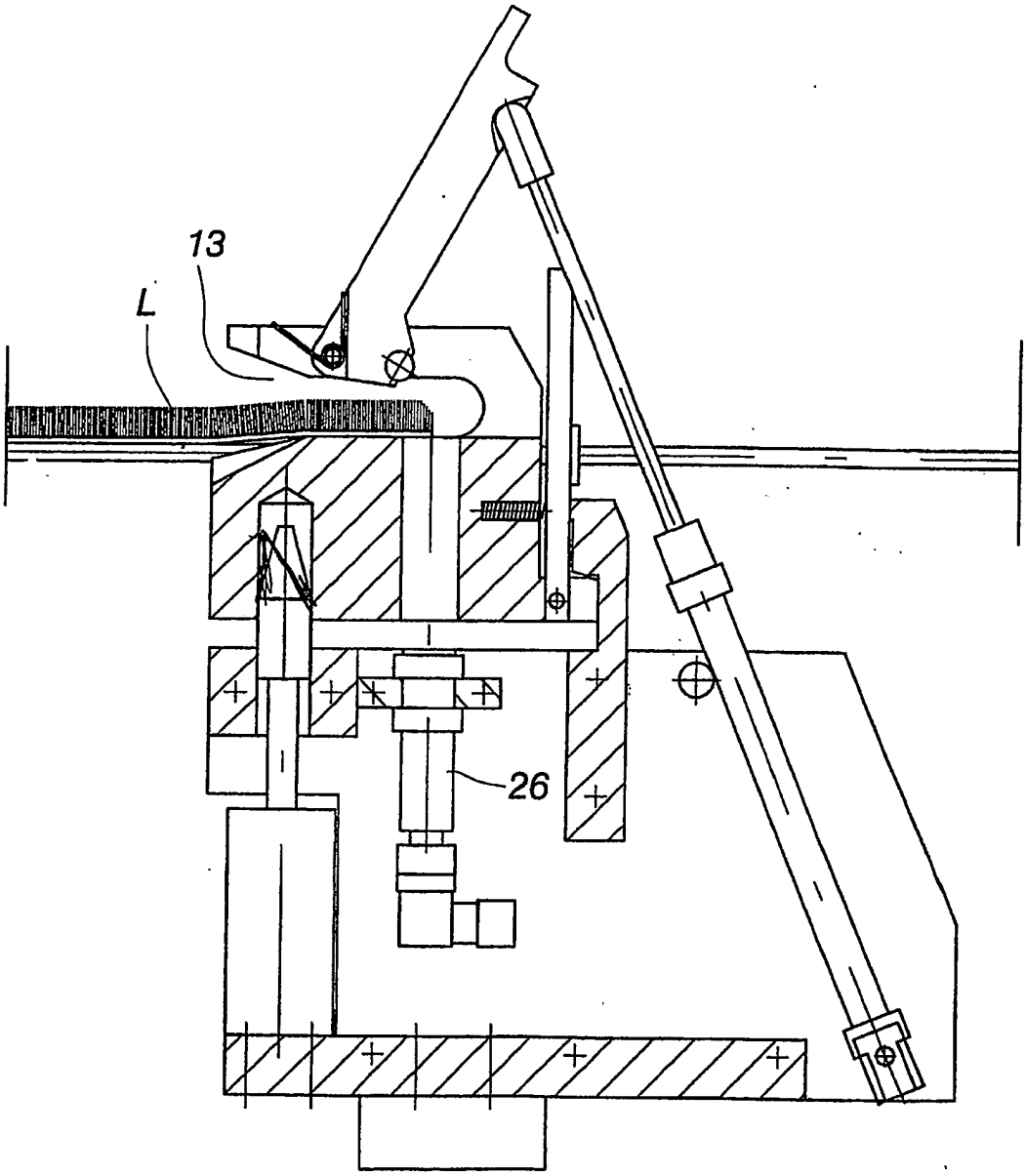

Fig.4B

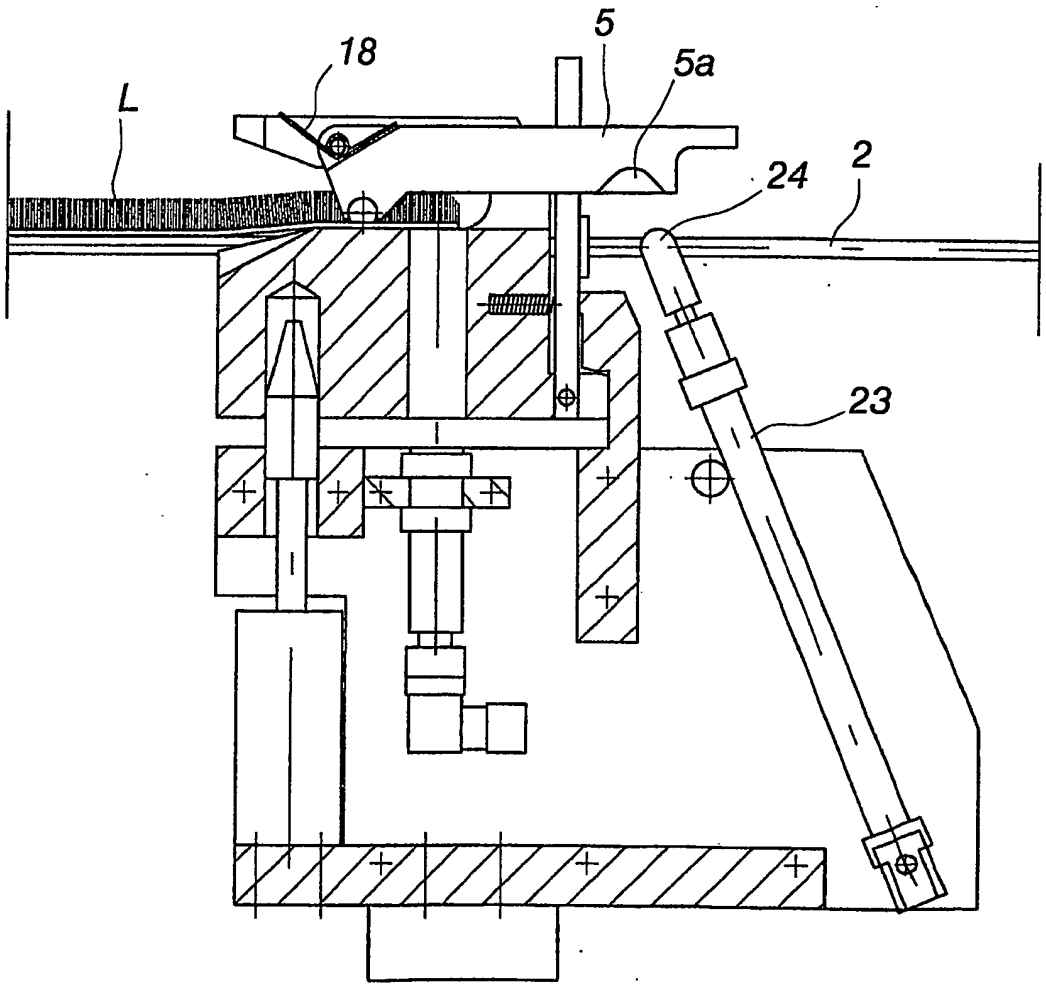

Fig.4C

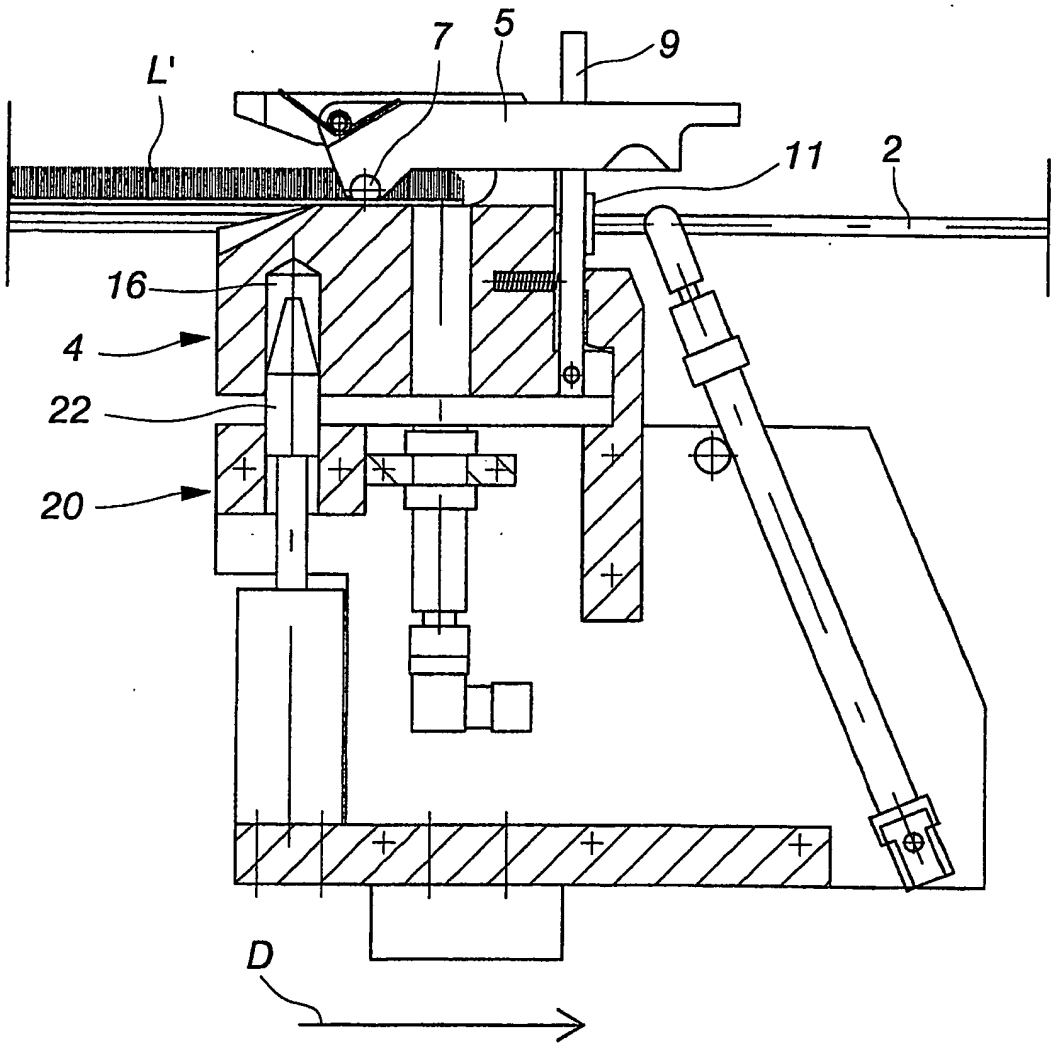

Fig.4D

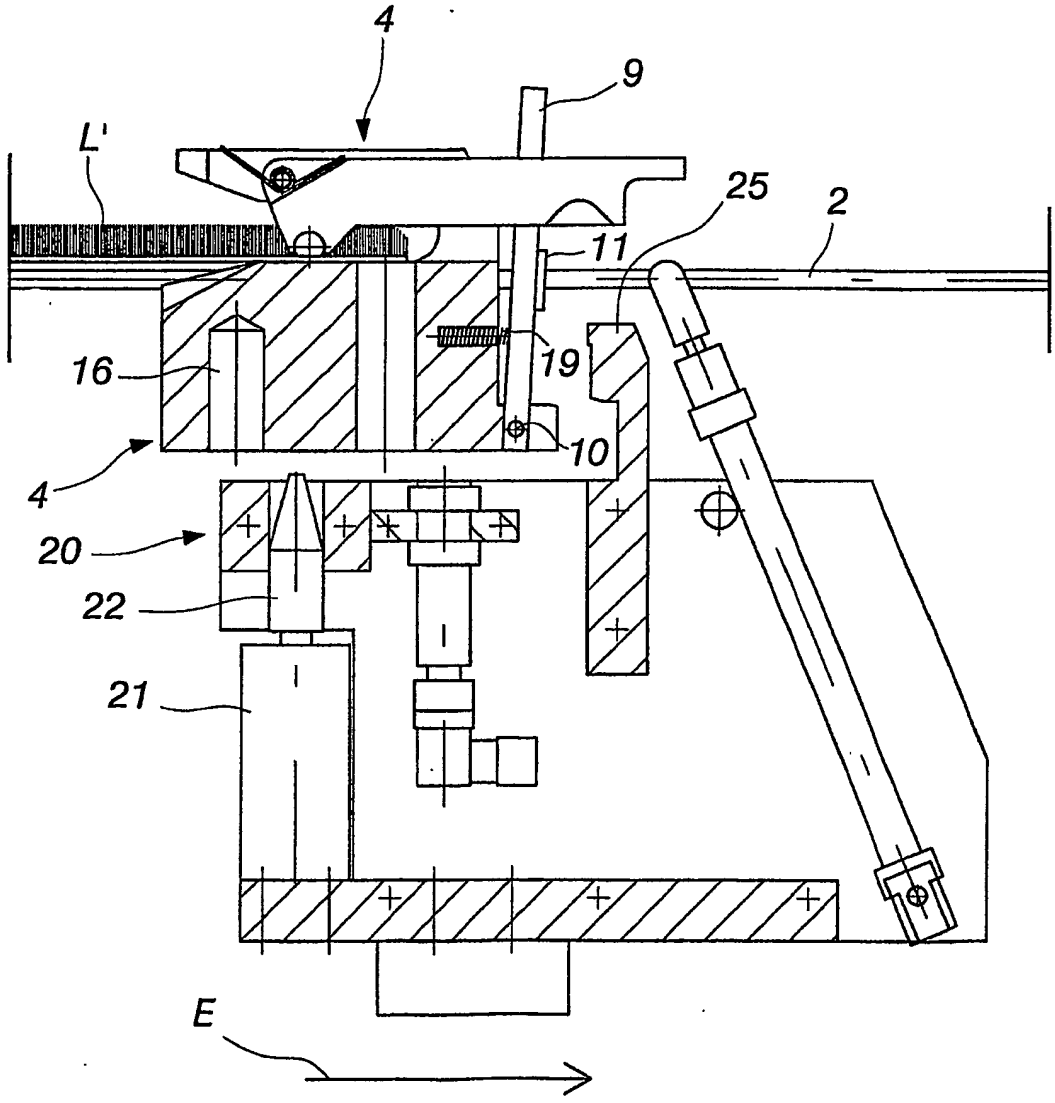

Fig.4E

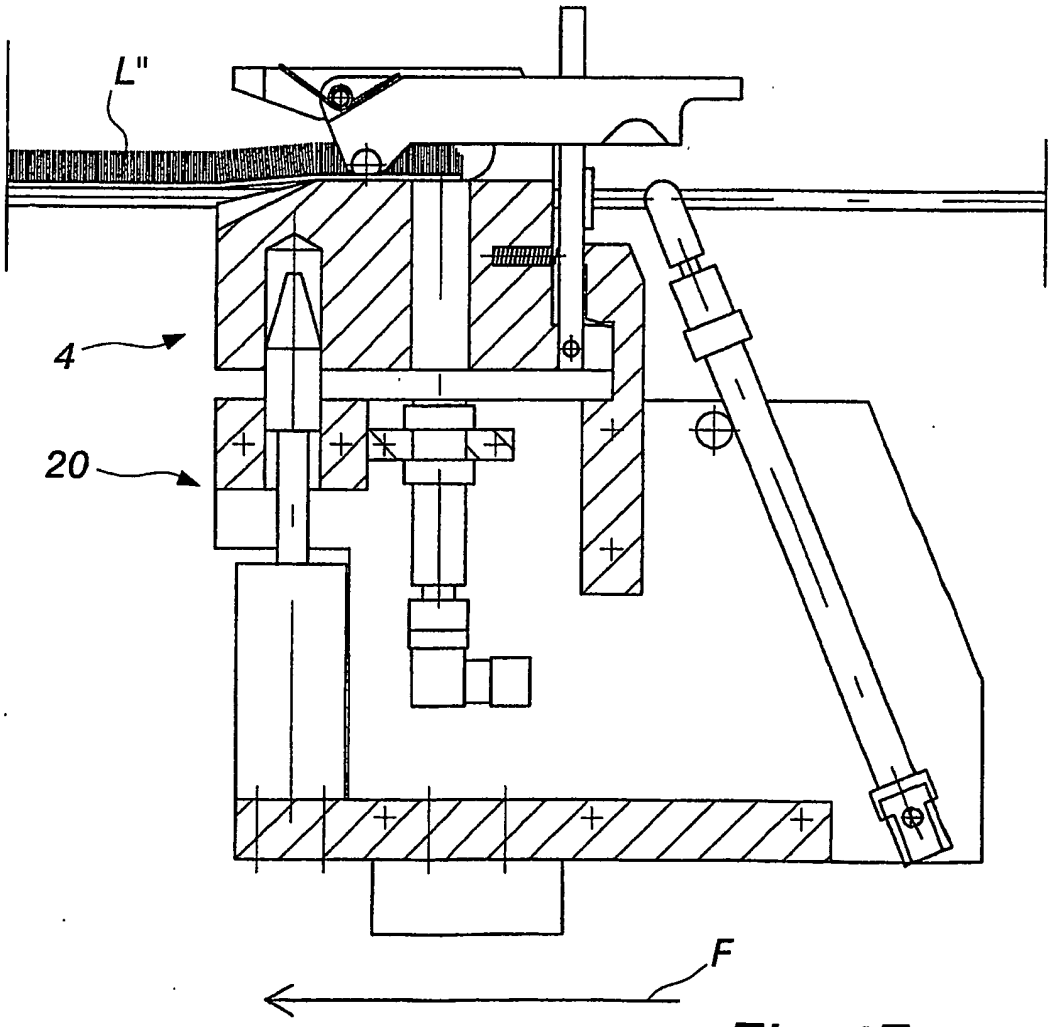

Fig.4F

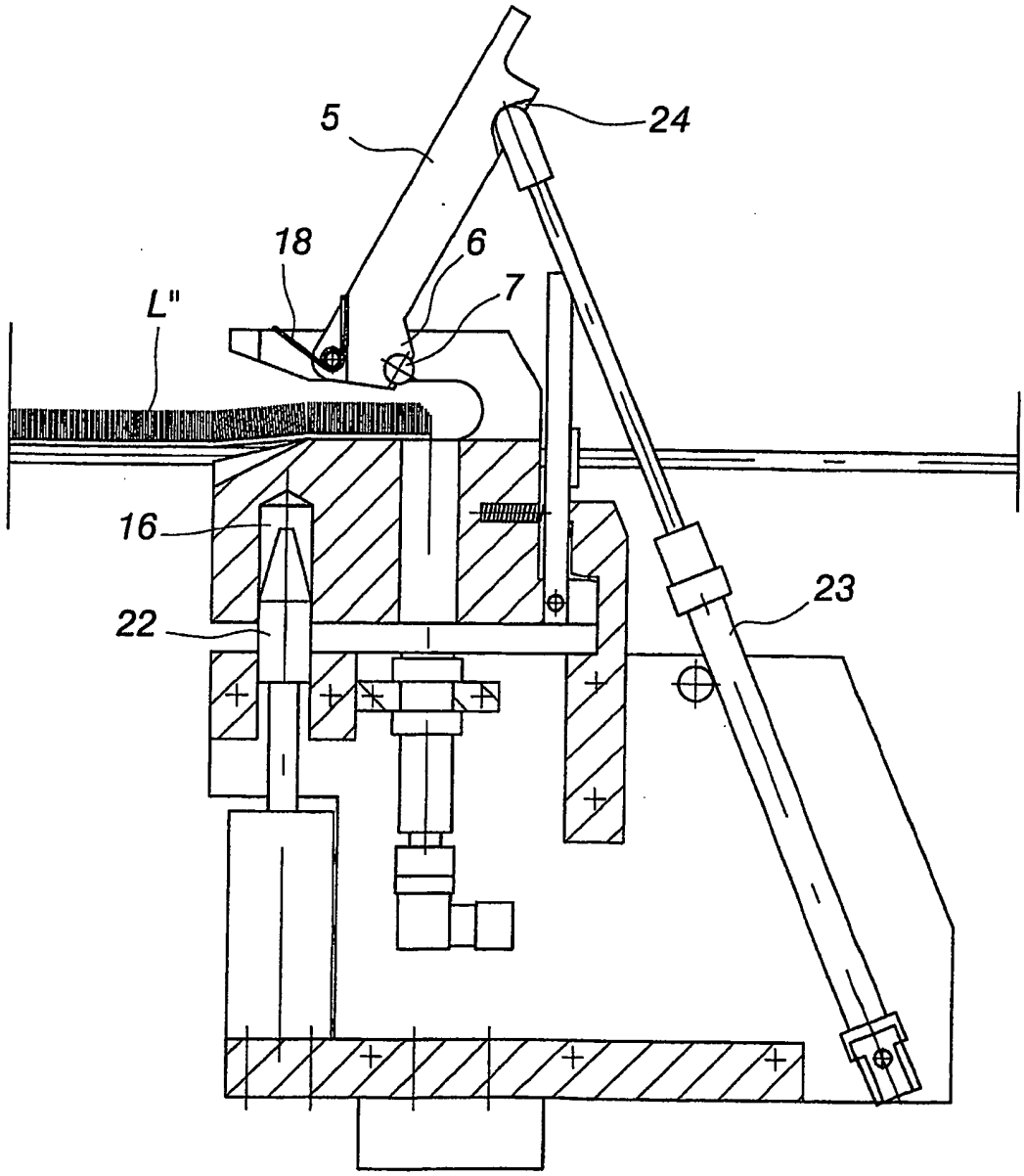

Fig.4G

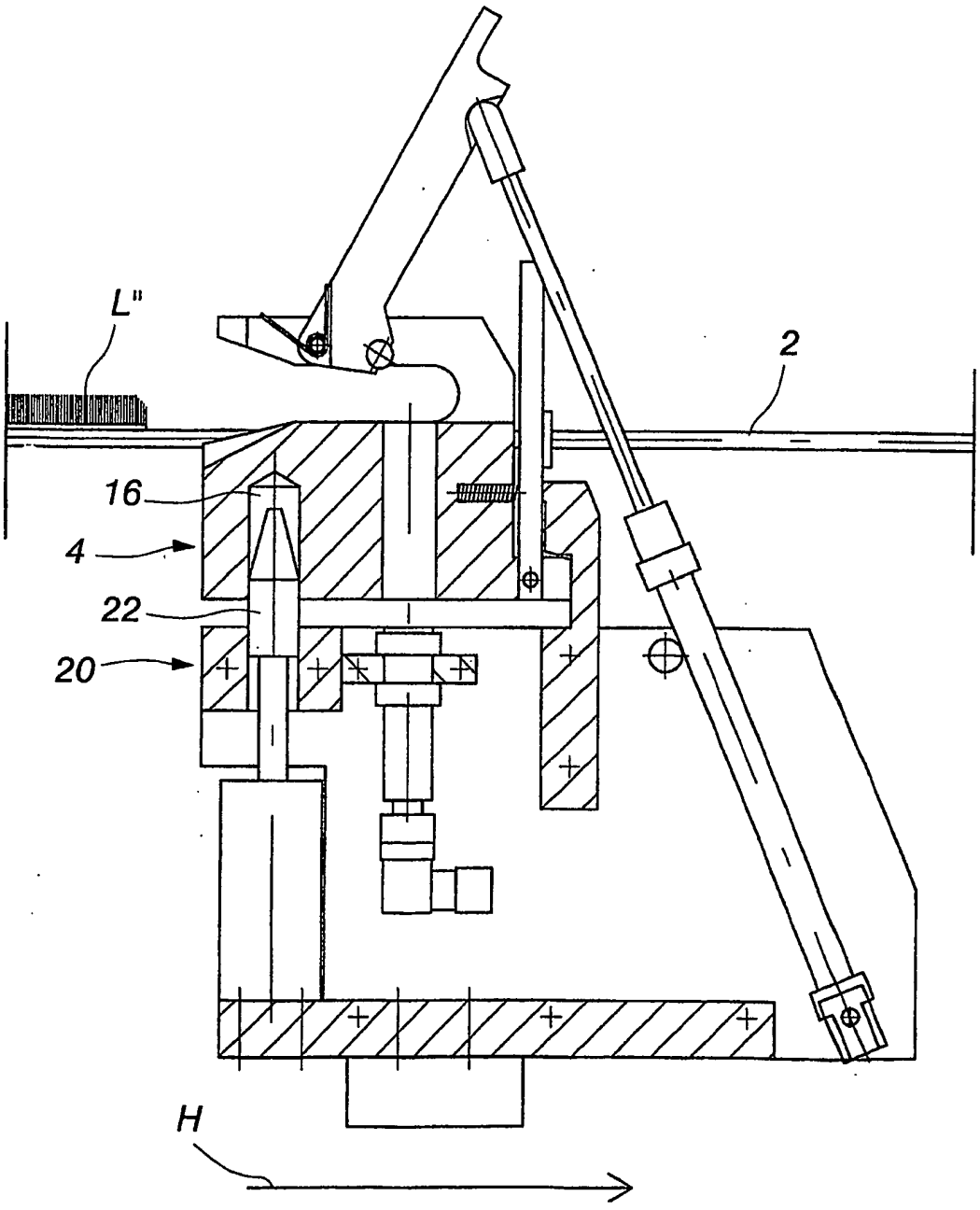

Fig.4H

INTERNATIONAL SEARCH REPORT

International application No.
PCT/FI 03/00060

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: C14B 1/26
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: C14B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-INTERNAL

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	DE 2322213 A (DESSILANI, TERESIO, BORGOSESIA, VERCELLI), 22 November 1973 (22.11.73), page 3, line 28 - line 29, figures 1,3,5	1,6
A	US 4202190 A (VILJANMAA), 13 May 1980 (13.05.80), figures 1,3	
A	US 4335594 A (VILJANMAA), 22 June 1982 (22.06.82), figures 1,3	

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
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"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
17 April 2003	22 -04- 2003
Name and mailing address of the ISA/ Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Facsimile No. +46 8 666 02 86	Authorized officer Magnus Thorén/EK Telephone No. +46 8 782 25 00

Form PCT/ISA/210 (second sheet) (July 1998)

INTERNATIONAL SEARCH REPORT

Information on patent family members

29/03/03

International application No.
PCT/FI 03/00060

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